App. F. IX-4

1930-1

File No. 27-30

Serial Nos. 17-20, 23 2

*Previous References*
I & C 28-18 (1-2)
" 28-18 (3, 4)
" 4-16 (1, 2 Chi 7 8)

*Later References*

**PRESERVED**

# General and Revenue Secretariat.

*Ser at Nos.* 415

**Part B for** Dec 31.

**SUBJECT.**

Manufacture of Cement in the State

D 3038 dt 15.12.31.

To Dir of Geology.

State that the proposal re
would have to be deferred
for the reasons specified

REPLY

*(To be written on this margin.)*

Memo No. 32.

OFFICE OF THE SECOND MEMBER OF COUNCIL.

NOTE

*Dated* 13th July *1927*.

DEVELOPMENT BRANCH

Has the question of making cement in the State been, at any time, examined? If so, the connected papers may be put up for my information.

Development Secretary with compliments.

13/7/27

14/7/27

14.7.27

C — The Dir. of Ge was requested in 1918 to work out and submit a Scheme for the manufacture of cement and he submitted a note drawn up by Mr. R. Vyasa Rao, Special Officer in charge of the Mineral Industries, on the investigation of Limestone near Vellapur with the ultimate object of manufacturing cement. As the Ellapur Mines were being explored by the Geological Dept. in connection with the Supply of flux for the Iron Scheme, the Dir. of Ge

General and Revenue Secretariat. | File No. of 192 .

Serial No.

T—

was requested to send up proposals on the matter in consultation with the Director of Geology

The Dept. of Geology contended that the investigation regarding the manufacture of cement rightly belonged to that Dept. and as the two Depts. did not come to an understanding on the Scheme it was ordered in Council that the question whether it was necy. to put down any boreholes & make further investigation may be referred to the Bd. of Scientific advice

A— The question was accordingly referred to the Bd. — but the Bd. does not seem to have sent up any Scheme at all on the Subject

Subs. with the files D.o 28-18-4 and D.o 28-18-2 at pages 42-16-8 The Industrial chemist Madras 27.7.27. may perhaps be entrusted with the working out of the Scheme.

From the discussions in File No 28-18, it will be seen that the Scheme was practically dropped owing to jealousies between the Director of Geology. Mr P. Raghavendra Rao was then of opinion that the scientific part of the work, namely, the quality and quantity

NOTE—Contn. sheet

General and Revenue Secretariat. | File No. of 192 .

Serial No.

good limestone available, and the necessary laboratory tests might be left to the Geol. Dept. and that the investigation of the commercial possibilities—i.e. cost of production, the extent of the demand, competition with foreign markets, the cost of initiating the industry etc. might well be left to the Industries Dept. Mr Vijaya Rao in this case has suggested a modest sum of Rs 7500/- to be allotted for carrying on experiments. This may perhaps be made available now, and the scheme taken up again. The matter may be discussed with Sir P.C., the Director of Industries & the Industrial Chemist. Meanwhile the Board will again move the Govt.

Dev-Secy) 28-7-27

Forwarded to the Secretary

The present heads of the Depts in question may perhaps find it feasible to arrive at a working understanding. The feasibility of the project depends as much on the quantity of lime of a given quality available (which is a matter for the Geol. Dept to investigate) as on the possibility of industrially manufactu

NOTE—Contn. sheet

370 (4

App. F. III—2]

General and Revenue Secretariat. | File No. of 192 .

Serial No.

a satisfactory (for sale cement) at competitive ~~rate~~ prices (which if in the province of the Deptt of Mines & Fuel) ~~&~~

I wd respectfully suggest the Dirs of the two Depts being called in for a consultation with the Member.

(2d Member) 30/7/27

I don't think this is a subject which could be usefully discussed by a Committee.

2/8/27

SECRETARIAT OF THE GOVERNOR GENERAL IN COUNCIL
3 AUG. 1927
No. 690

I have discussed this with the Director of Geology. I understand from him the fact that lime and clay are not found close to each other in the State and the need for ~~getting~~ coke ~~being~~ to be brought from a long distance are some of the difficulties that are in the way of considering this proposition here. Further investigation may perhaps show that transport of lime and clay to the place of manufacture is not a prohibitive factor and the use of electric power in place of coke is also worth ~~investigation~~ consideration. In any case, it is well to examine the problem fully and then abandon it if there

NOTE—Contn. sheet

WD 0324—GPB—60,000—24-5-27

Serial No.

there are difficulties which are really insurmountable. We might ask the Director of Industries & Commerce to have this subject considered in consultation with the Director of Geology and the Industrial Chemist. If any small amount is required for conducting experiments, it may be placed at his disposal.

3/8/27

Please put up file to Dir IC

4 8 27

Draft Sub.

16.8.27

Approval Govt

19.8.27

Dir Secy)

Issue

20-8-27 Govt

2078

20 Dir. of Ind.

D. 1948 | 22.8.27

States that it is desirable to investigate thoroughly the question of the possibility of manufacturing cement on a commercial scale in the State & requests him to examine the question in consultation with the Director of Geology & the Ind. chemist.

NOTE—Contd. sheet.

GEN. & REV. SECRETARIAT 15 NOV 1927 DEVELOPMENT BRANCH.

WD 0324—GPB—60,000—24-5-27

Serial No.

A. Ramaiya, Udayarkoil, Tanjore

16.4.31.

States that he studied Cement manufacture in England (after obtaining a Madras govt. scholarship for the study of the subject) and offers his services for manufacturing Cement in the State.

1 The Dir. of Etc was requested in August 1927 to investigate the feasibility of manufacturing Cement in consultation with the Dirs. of Geology and the Govt. chemist. He has not yet submitted his report on the subject inspite of reminders.

Reply in linked file Etc 53-27-1

2 The applicant's representation may perhaps be forwarded to the Dir. of Etc for report whether his services can be utilised in any useful manner.

Subd. for orders 3 If appd the Declaration may be marked whether it is necessary to pursue the question of local manufacture of Cement, as hitherto recorded in the first margin minute of 3/8/27 in the linked file.

Dev Secy 4. Appd. The D.I.C. may be asked to send a early reply.

5/5/31

5/5/31

NOTE.—Contn. Sheet

WD 02553—50,000—GPB—8-7 30

1 7275

File No. 27 of 1931 | General and Revenue Secretariat

Dft. Sent
Instructions
7.5.31

Issue Instructions
Mrs
11/5/31

To ~~the Govt. of Bihar~~
D. 10296 dt 13.5.31
Forwards the petition for remarks & enquires whether it is not possible to pursue the question of the local manufacture of cement.
Result?. This may also be submitted to 1st Member for perusal, if asked

18

Instructions sent
19.5.31

19-5-31

Secretary
1st Member

19/5/31 Mrs 19/5/31

Mrs 20/5/31

20-5-31
Mrs 20/5/31

RECEIVED
1813

GEN. & REV. SECRETARIAT
1 MAY 20, 31
DEVELOPMENT BRANCH.

General and Revenue Secretariat | File No. of 193 .

Serial No.

No. D. 56

Public Works Secretariat.

Subject:-- Buildings etc., at the Soldevanhalli Pumping Station.

Submitted to the Dewan of Mysore.

2. After the Thippagondanahalli Reservoir comes into operation , the Pumping Station buildings at Soldevanhalli including the Pump House, Staff Quarte Travellers' Bungalow, Dispensary and other available buildings and extensive grounds together with the Hesserghatta Tank water also will become available. If some factory could be opened at this place all these buildings would come in very handy. One of the new industries that may be started with fair prospects of success is the manufacture of cement. We are at present importing a large quantity of cement for Government works. There is a good deman from the public too for this material about which the Director of Industries and Commerce may have definite figures. The Bangalore-Poona line runs quite close to the Pumping Station and a siding can be easily arranged for.

3 I would therefore suggest that the Director of Industries and Commerce be requested to work out a Scheme for opening a Cement Factory.

4 The favour of orders is solicited.

8-7-31

Sd) M. G. Rangaiya,
Secretary to Government,
Public Works Department.

NOTE--Contn. Sheet

WD 02553--50,000--GPB--8-7 30

5 Please submit this to First Member.

6. If we could only make our own cement, it would be a grand thing.

Intd. M.M.I.
9-9-31.

First Member) Intd. M.G.K.
10-7-31.

7. There is a file on this subject which may be put up.

Intd. M.N.K.
10-7-31.

Dev. Secy)

8 Early please.

Intd. D.S.
11-7-31.

9. I & C 53 of 1927 is submitted.

Intd. K.P.
11-7-31.

10 Please see First Member's minute (flag A) dated 3rd August 1927 in the collection placed below. The Director who was asked to investigate the matter and submit a scheme has not done so in spite of several reminders. He was again reminded on the subject on 13th May 1931 forwarding an application of one Mr. A. Ramayya of Madras who offered his services for manufacture of cement locally. The Director's report is awaited.

Intd. M.S.K.
13-7-31.

Dev. Secy.)

First Member.

Intd. D.S.
13-7-31.

Serial No.

14 JULY 1931
No. 365

10. Please see first member's minute (flag A) of 3.8.1927 in the Collection placed below. The Director who was asked to investigate the matter and submit a scheme has not done so in spite of several reminders. He has again been reminded on the subject on 13-5-31 forwarding an application of one Mr A. Ramayya of Madras who offers his services for manufacture of Cement locally. The Director's report is awaited

Mr
13.7.31

Dev Secy)

1st member) D
13.7.31
Mem
14.7.31

11. This question has been considered in the past several times, but on no occasion was it seriously pursued. I discussed it with the Director of Geology in 1927 and he gave me to understand that the fact that lime and clay are not found close to each other in the State and the need for coke which has to be brought from a long distance, are two of the chief difficulties that are in the way of making cement here at a reasonable cost. I, however, considered it necessary to conduct further investigations into the matter and had a communication addressed

Note -Contn. sheet

WD 762—GPB - 3,000—17-10-30

to

General and Revenue Secretariat | File No. of 193 .

Serial No.

to the Department of Industries & Commerce. But so far no action in the direction indicated appears to have been taken.

12 The problem is an important one and I consid it desirable that it should be seriously studied with a view to see whether we can make cement here at a reasonable cost. An officer of the Geologic Department may be required to study the whole ques tion and submit a note in a couple of months. The Department of Geology can spare one of its office for this work.

Dewan's Office 657 16. JUL. 1931

15/7/31

Dr 16.7.3

16/

13 16-7-31

14 put up dft. accdg. to 1st member's note

Dr 17.7.3

17.7

15 Dft. Subs. 20.7

Dev Secy

20.7.31

16

17/7/31

Typed dft. Subs. 24.7.31 Dev Secy

18

25-7-3

25/7/31

NOTE—Contn. Sheet.

WD 02553—G P B—50,000—8-7 30

~~The Director of Geology~~
D: 609-610-611 D: 30-7-31

19

state that the problem of the manufacture of Cement in Mysore may be investigated by an experienced officer of Geological Depttt.

Copy to Director of D & C
" Secy to Govt P.W.D.

GEN. & REV. SECRETARIAT
5 AUG. 1931
DEVELOPMENT BRANCH.

5.8.31

20.

The Secretary to Govt. P.W.D.
D. 1426 dt 4.9.31

Forwards file re utilisation of Buildings at Sidlaghatta [illegible] for a cement factory.

GEN. & REV. SECRETARIAT
11.9.31 4 SEP. 1931
DEVELOPMENT BRANCH

From the Director of Geology
6101-9 dt 12.11.31

Submits with his remarks the Report of Mr. B. Balaji Rao, who ~~was~~ made a Study of the limestone deposits of the State and the possibility of manufacturing Cement ~~in the~~ locally and suggests that a Sum of Rs 10,000/- might be set apart for a thorough investigation of the available raw materials and other details that a committee appointed to examine the subject with the assistance of an expert.

Subd for perusal and orders with Refce to the present Secretn's minute in para 12.

Sd/ 26.11.31

The Director of Geology says that having regard to the distance

of Cuni deposits and the non-existence of scaling deposits of fire clay in the neighbourhood of Hemavathi, Hassan of a factory at Devanahalli, in spite of the other conveniences that place can command, is not likely to be a commercial proposition.

He suggests instead locating the factory at Bhadravati, as cement can be manufactured direct from the blast furnace slag and the other raw materials as well as fuel & electric power are easily available there.

The question requires further details investigation with the assistance of an Expert. The Director of Geology thinks that a scheme can be prepared if Govt can provide about Rs 10,000. He does not however give details for the sum asked for.

It is doubtful if Govt can find in the present circumstances Rs 10,000 for the purpose or even pay their dues; in which case there seems to be no object in postponing the consideration of the question till funds can be made available.

If approved this papers may be put up for consideration again in July 1932

Mor
24.11.31

Dev Sec'y)

The proposal may be dropped for the present. The Govt. have now on their hands a number

NOTE—Contn. Sheet.

WD 70—GBPM—60,000—13-8-31.

APP. F. VI. gl.]

SUBJECT.....

.....

.....

Section 9 (c

File No. 53 - 27

Serial No. 1

*Diary No. of letter replied to* .....

No.

General and Revenue Secretariat

( )

*the* *192*

To

..... The Dir. of Dte .....

Date of issue.....

Sir

Signed by.....

I am directed to invite
The letter
reference to ~~Indent~~, no. 7092, Dt 28-35-
4 of 31st Jan. 1919 from The Secy. E & A,
referring the question of investigating
the possibility of manufacturing Cement
in The State on a commercial Scale
to The Bd. of Scientific Advice & The Dept of
Dte and to State that, as the
~~application~~ investigation does not seem to have
~~been undertaken~~, Govt. consider it
desirable That The question should be
~~Board to be~~ thoroughly investigated

List of enclosures.....

Copied by.....

Examined by .....

*over*

and the possibility of bringing together lime & clay to a central place & manufacture and & using electric power in place of coke for the manufacture of cement, examined. I am according to request you to consider this Subject in consultation with The Director of Geology and the Industrial chemist and report at an early date what action is feasible ~~in the matter.~~ That may be ~~of~~ any small amount ~~is~~ required for Conducting experiments [illegible] placed at your disposal after hearing from you.

Should be

Yours &c

19-8-27 Dev Secy.

[illegible]

Pet. No. 1842

OFFICE OF THE DEWAN OF MYSORE,

*Bangalore, dated* 20 : 4 ..... 1931.

9rc 27-30-17

The accompanying petition addressed to the Dewan is forwarded, with compliments, to the Secretary to Government, Development .... Department.

GENERAL SECRETARIAT
25 APR 1931
No

DEVELOPMENT BRANCH

By Order,

*Private Secretary to the Dewan.*

Appendix F G—1

(2

SUBJECT.....

.....

.....

Section Src

File No. 27-30

*Diary No. of letter replied to*.....

Serial No. 18

No. D 10296/Secre

General and Revenue Secretariat

( )

*the* *193* .

To

The Dist. of Sec.

Date of issue 13/5/31

Sir

Signed by Th NS Ramachandra

In forwarding herewith for favour of a report the representation of Mr. A. Ramaiya offering his services for manufacturing cement in the State, I am directed to invite a reference to this office letter no. D. 1948/2 Sec 53-27 of 22.8.27 requesting you to investigate the possibility feasibility of manufacture locally Cement in the State and to enquire whether it is not possible to pursue the question of local manufacture of Cement, as touched in the letter

List of enclosures.....

Copied by.....

Examined by.....

[over

WD 02559—GPB—25,000—25-6-30

~~22.8.1924 reference date~~

Very
~~An early Reply is requested~~

24.

~~Miss~~
11/5/24

Finkle
2nd

Gle 27-30-19

(4) 7

To

The Director of Geology in Mysore,

Bangalore.

Sir,

In forwarding herewith copy of a note by the Secretary to Government, Public Works Department, proposing that the buildings at Soldevanhalli might be used for the manufacture of cement, I am desired to state ~~that Government observe~~ that the problem of the local manufacture of cement is an important one ~~and it~~ which should be seriously studied with a view to see whether cement can be ~~manufa~~ manufactured in the State at a reasonable cost. I am accordingly to request that an experienced officer of the Geological Department may be required to study the subject and submit a ~~report~~ note in a couple of months in consultation with the Director of Industries and Commerce, if necessary.

I have etc.,

Development Secretary.

Copy to the Director of I. & C. for information in continuation of this office letter No.D.10296/I.&.C. ~~dated~~ 27-30-18 dated 13-5-31 on the subject.

B.O.

For ~~Dev.~~ Secy. to Govt.
Dev. Deptt

Copies of the above to the Secretary, P.W.D. for information.

B.O.

For ~~Dev.~~ Secy. to Govt.
Dev. Deptt.

EBM (4) 27/7

S.R.-1

GOVERNMENT OF HIS HIGHNESS THE MAHARAJA OF MYSORE

General and Revenue Secretariat

No. [illegible] Bangalore, Dated .....

From

The Secretary to the Government of His Highness the Maharaja of Mysore,
Development Department.

To

The Director of Geology in Mysore,

B A N G A L O R E.

Sir,

In forwarding herewith copy of a note by the Secretary to Government, Public Works Department, proposing that -- the buildings at Doldevanhalli might be used for the manufacture of cement, I am desired to state that the problem of the local manufacture of cement is an important one which should be seriously studied with a view to see whether cement can be manufactured in the State at a reasonable cost. I am accordingly to request that an experienced officer of the Geological Department may be required to study the subject and submit a note in a couple of months in consultation with the Director of Industries and Commerce, if necessary.

I have the honor to be,

S i r,

Your most obedient servant,

(Sd) D. Srinivasa Iyengar,
SECRETARY TO GOVERNMENT,
DEVELOPMENT DEPARTMENT.

E.W.M/4.

Memo No. , Bangalore, July 1931.

Copy of the foregoing is forwarded, with compliments, to the Director of Industries and Commerce in Mysore, for information in continuation of this office letter No. D.10296/I & C.27-30-18 dated the 13th May 1931 on the subject.

" BY ORDER "

(Sd) D. Srinivasa Iyengar,

SECRETARY TO GOVERNMENT,
DEVELOPMENT DEPARTMENT.

Memo No. Bangalore, July 1931.

Copies of the above are forwarded, with compliments, to the Secretary to Government, Public Works Departments, for information.

" BY ORDER "

FOR SECRETARY TO GOVERNMENT,
DEVELOPMENT DEPARTMENT.

Appendix F G–1]

SUBJECT

9

Section 21c

File No. 27-30

Serial No.

Diary No. of letter replied to

No. D1426/Sec 20

To Director & Ex Officio P.W.D.

Sir,

I am directed to forward herewith as desired in your letter No 18289 10-8-31 your office file regarding the Buildings at Soldevanahalli Pumping Station for a Cement factory.

I have to

Secy

1-9-31

for Secy Dev. Dept

General and Revenue Secretariat

( )

the 193 .

Date of issue 4/9/31

Signed by [illegible]

List of enclosures

Copied by

Examined by

161

D 5971 8

No. 1828
Encls:

PUBLIC WORKS SECRETARIAT,

Dated Bangalore, 10-8- 193 1

FROM

GEN. & REV. SECRETARIAT. 11 AUG. 1931 DEVELOPMENT BRANCH.

The *Secretary to Government,*
*Public Works Department,*
*Bangalore.*

To

The Secretary to Government,
Development Department.

DEVELOPMENT SECRETARIAT. 10 AUG. 1931

Sir,

Buildings at Soldevanhalli Pumping Station.

27-30-4

With reference to your Memo No. D.611 dated the 30th July 1931, regarding the utilisation of the above buildings for a Cement Factory I have the honour to request that this office file on the subject may kindly be returned early.

I have the honour to be,
Sir,
Your most obedient servant,

FOR SECRETARY TO GOVERNMENT,
PUBLIC WORKS DEPARTMENT.

Sent with a draft returning the file

18

N.J.P.

1/9/31

TYPING SECTION 1. SEP. 1931 GEN. & REV. SECTT.

D&C 27-30-23

D 1790

GOVERNMENT OF MYSORE.

GEN. & REV. SECRETARIAT
14 NOV 1931
DEVELOPMENT BRANCH.

Telegraphic Address:—"GEOL."

MYSORE GEOLOGICAL DEPARTMENT.

No. *Bangalore,* ...12th...November..... ...193 1

FROM

DEVELOPMENT SECRETARIAT
13 NOV. 1931

A. M. SEN, Esq., M.Sc., F.G.S., etc.,
Offg. *Director of Geology in Mysore,*
*Bangalore.*

To

B.T. Kesavaiengar, Esq., B.A.,
Secretary to the Government of
His Highness the Maharaja of Mysore,
Development Department,
Bangalore.

SIR,

Adverting to your letter No.D.609/I&C.27-30-19 dated 30th July 1931, asking for a note on the subject of cement manufacture in the State and the use of the buildings at Soldevanhalli for the purpose, I have the honour to state that Mr. B. Balaji Rao, Offg. Deputy Director of the department - who has made a study of the limestone deposits of the state - was requested to write a report on the subject; his report is submitted herewith for the perusal of Government.

It deals with the various aspects of the manufacture of cement. The supply of raw materials and the available buildings at Soldevanhalli appear to be the principal items of investigation, as brought forward by the Chief Engineer and Secretary to Government, Public Works Department, in his note No.D.56, dated 8th July 1931, submitted to the Dewan.

The raw materials consist principally of limestone and clay - in the approximate proportion of 75 to 20%. The principal limestone deposits, suitable for the manufacture of cement as found out after investigations, are located at Voblapur in the Gubbi Taluk, situated at about 12 miles from Bansandra the nearest station on the Bangalore Poona section of the

of the M.S.M. Railway. This limestone deposit is the nearest to Soldevanhalli and is at a distance of about 76 miles away - of which 64 miles are along the railway line and 12 miles by road and cart track. As regards clay, some deposits have been located near Bansandra and near the villages of Kondli, MusKondli and Mavinhalli and other places not far away from the limestone quarry. The available quantity of clay is not known as detailed investigation to draw up an estimate has not been carried out yet.

It is not known if any good suitable clay can be had near Soldevanhalli; it is likely clay may be found in some of the tank beds and in nullas and behind the Hessarghatta tank bund. To find this out, some detailed prospecting work by means of boreholes has to be undertaken.

Thus in respect of the principal raw materials required for cement making Soldevanhalli is not at all conveniently situated. On an inspection of the buildings and grounds at Soldevanhalli, I consider that they may be used with necessary additions and alterations for a factory of this type; but the chief drawback of this site would be its long distance from the limestone deposits which practically form 75% of the necessary raw materials.

Next in importance in cement making are the two items, fuel and power. In addition to the abundant supply of raw materials of good quality, there should be an adequate supply of fuel at a reasonable cost for the manufacture of cement. Generally the total quantity of fuel for burning the raw materials and for the production of power may be roughly taken as about 50% of the weight of cement produced.

Of all kinds of fuel used for burning cement in rotary kilns, pulverised coal is the most common, while others such as coke, crude oil, natural gas or producer gas are either very expensive or not easily available. Another mode of burning cement is by Electric heating. It has however been found in many cases the cost of electrical burning is prohibitive, except in very exceptional circumstances where the power may be obtained very

very cheap.

Power to be used in cement works is second in importance to the raw materials; a cheap supply of both is necessary for a profitable undertaking. As noted in Mr. Balaji Rao's report, the electric power is considered to possess many advantages; and where available at reasonable cost, it is mostly used. In this respect Soldevanhalli has the chief advantage that electric power is already available there.

Thus we see if a cement factory is to be located at Soldevan-halli, it will have the following advantages:-

(1) Electric power is already available there.
(2) Sufficient quantity of water may be had from the Hessarghatta tank, to be brought by the existing channel.
(3) There are a number of buildings, which may be used for the factory, with suitable additions and alterations.
(4) The site is very near the railway line, a siding from which will easily connect the works.

But the chief disadvantages are the following:-

(1) Its distance from the principal raw material - limestone - which forms about 75% of the total quantity of raw material required.
(2) A good amount of prospecting has to be done to find out deposits of suitable clay in the neighbourhood; if not available here, it has also to be brought from a distance.
(3) Fuel (coal) has to be brought from the northern collieries by railway.

The expenses to be incurred in transporting the raw materials will in all probability outweigh the advantages available at Soldevanhalli; and I am inclined to think that the location of a cement factory at Soldevanhalli under the above conditions will not be a profitable concern.

The next important point to consider in starting a cement factory, apart from the available raw materials, is the market for

for the manufactured products. The following figures for the total quantity of cement imported into the State are kindly furnished by the Director of Industries and Commerce. in Mysore:-

| | | | |
|---|---|---|---|
| 1928-1929 | .. | 7160 | tons. |
| 1929-1930 | .. | 7778 | ,, |
| 1930-1931 | .. | 8648 | ,, |

These figures furnished by the railways refer collectively to the imports received on behalf of the Government departments and those received by the general public. On an average about 4000 tons of cement are being consumed every year in the Kolar Gold Field area by the different gold mining companies.

When the large constructional engineering works now in progress in the State are finished, it is very likely the demand will be less. From the available statistics the average annual consumption of cement in the State may be taken as about 6000 tons. It is not known if the gold mining companies who consume more than half the total import would buy the local products. It may be that local cement, if of standard quality, would probably be more in demand, as the imported material would be liable to be air-slaked during transport and would thereby get deteriorated, unless properly packed up; and the local material would compare favourably in price, if carefully and economically manufactured.

For an output of 5000 tons a year, the following rough estimate may be made for the cost of one ton of Portland Cement -

(continued on another page)

| | Rs. | As. | P. |
|---|---|---|---|
| 1.6 tons of limestone at Rs.2/- per ton | 3- | 4- | 0 |
| .4 ton of dry clay at Re.1/8/- per ton | 0- | 10- | 0 |
| Power for grinding raw materials and clinker (at one annas per unit for electric power) .... | 12- | 0- | 0 |
| Pulverised coal for rotary kiln (1/3 ton) .... | 8- | 0- | 0 |
| Labour ... .... ... .... | 3- | 0- | 0 |
| Supplies, repairs etc. .... | 4- | 0- | 0 |
| Supervision, Laboratory, Office etc. | 4- | 0- | 0 |
| Depreciation 10% on the capital outlay of Rs.2.5 lacs. | 5- | 0- | 0 |
| Interest 5% | 2- | 8- | 0 |
| Cost of bags or barrels. | 5- | 0- | 0 |
| Total per ton packed. | 47- | 6- | 0 |

Imported cement costs about Rs.60/- per ton at Bangalore. If electric power could be had at cheaper rate, say 0.5 anna per unit, the cost of power would come down; but if the work is concentrated in one place and is done in conjunction with burning and crushing of limestone for other industrial purposes, the charges for staff, supervision, depreciation etc could be reduced and the cost of production would be less. If the cement manufactured turns out to be of good quality and standard specification, profitable work should be quite possible.

It may be pointed out that Portland cement can be directly produced from Blast furnace slag, either from the molten slag, further heated in an electric furnace, or from the quickly cooled granulated slag, with a proper admixture of limestone and other necessary materials. As charcoal (instead of coal) and electric power would be available at Bhadravati, and high calcium limestone at Bhadigund is close by with a connecting tram line, Bhadravati would be a better site for a cement factory than Soldevanhalli.

If however the manufacture of cement in the State receives

the serious attention of Government even under the present financial strain, I beg to suggest that a sum of Rs.10,000/- should be set apart for a thorough investigation of the available raw materials and other necessary details; and a Committee may be appointed to examine the subject with the assistance of an expert who is thoroughly acquainted with the process of cement making, which is a delicate and complicated operation.

The Committee may consist of:

The Chief Engineer, Public Works Department (Chairman)
The Director of Geology (Convener)
The Director of Industries & Commerce in Mysore
The Principal, Engineering College, Bangalore

with power to co-opt any other member if necessary. The Committee should be authorised to seek the help and advice of an expert in cement making, whose expenses have to be paid out of a special grant.

I have the honour to be,
Sir,
Your most obedient servant,

A. M. Lee

Offg. D i r e c t o r,
Mysore Geological Department.

Bs.12/Xi

The Mysore Geological Department.

Bangalore, Dated 7. 11. 31.

From

B. Balaji Rao, Esq., B.A.,

Superintendent, Government Chrome Mines,

Bangalore.

To

The Offg. Director,

Mysore Geological Department,

Bangalore.

Sir,

With reference to letter No.D 609/A.C.27-30-19 dated 30th July 1931 from the General and Revenue Secretariat asking for the submission of a note on the suitability of limestones in Mysore for the manufacture of cement and whether the buildings at Soldevanhalli pumping station which will be available after the construction of the new water works at Tippagondanhalli, could be utilised for the erection of a cement plant, I have the honour to submit a brief note on the subject.

The subject will be treated under two main heads:

1. Suitability of Mysore Limestones for the manufacture of cement.
2. Location of the cement plant, preferably at Soldevanhalli.

1. The principal materials necessary in the manufacture of cement are limestone and clay - the two contributing in the proportion of approximately 75 and 20% respectively, the remaining 5% being made up of Magnesia, sulphur, alkalies etc. Portland cement is defined as"the product obtained by finely pulverising clinker produced by burning to semi-fusion an intimate artificial mixture of finely ground calcareous and argillaceous materials, this mixture consisting approximately of three parts of lime carbonate ( or an equivalent amount of lime oxide) to one part

of silica, alumina, and iron oxide - the ratio of lime (CaO) in the finished cement to the silica, alumina, and iron oxide together shall not be less than 1.6 to 1 or more than 2.3 to 1". (Eckel on cements, limes and plaster).

Approximate composition of Portland Cements is :- Tricalcic silicates (3 CaO, $SiO_2$) corresponding to the proportion - CaO - 73.6%, $SiO_2$ - 26.4%. But there are some which differ markedly from the above composition. Aluminium is also present forming with part of the lime dicalcic aluminate (2 CaO, $Al_2O_3$). In addition to these, there are other impurities either accidental or intentionally added. In the latter case, calcium sulphate in small quantities is added to retard the setting of the cement. Iron oxide is also permissible within reasonable limits and in some cases as a substitute for alumina and the two may be calculated together. Magnesium carbonate is rarely absent from limestone or clay and magnesia is therefore almost invariably present in the finished product in small percentages. Manufacturers prefer to keep this ingredient as low as possible as they consider it detrimental even in small amounts - less than 5%.

Clays are essentially chemical compounds, containing silica alumina, oxide of iron, lime, magnesia, sulphuric anhydride and alkalies. The average analysis of a good clay is as follows:-

| | % |
|---|---|
| Silica | 57.02 |
| Ferric Oxide | 6.64 |
| Alumina | 16.20 |
| Lime | 3.27 |
| Magnesia | 2.62 |
| Sulphuric anhydride | 0.07 |
| Alkalies | 1.60 |
| Iron pyrities | 1.93 |
| Combined water and loss. | 10.65 |
| | 100.00 |

This is the composition of dried clay. The average percentage of water in the clay as dug is 44.8%. The manufacture of Portland Cement is both a mechanical and chemical process. In the former the raw materials are thoroughly crushed, ground and mixed to such fineness that 90 to 95% of the mixture will pass through a

a sieve having 32,400 holes per square inch. The chemical process consists in the burning of the raw materials to incipient fusion by which the water present naturally in them and that added for mining purposes is evaporated after which a temperature is reached when the organic matter present in the clay and the $CO_2$ in the lime are expelled in the form of gas. When the temperature in the kiln goes up still higher reaching 2600° to 3000° F, the lime chemically combines with the silica and alumina of the clay producing portland cement clinker. The last and final process is the cooling and grinding of this clinker.

Having now considered the essential raw materials required for the manufacture of cement with their permissible chemical composition, I now come to the limestone resources in Mysore.

Considerable work on the limestones occurring in Mysore has been done by the department ever since the department came into existence and the results of the work are to be found in the departmental Records* and Bulletins* published from time to time. From a perusal of these it will be seen that a large number of deposits have been located in various places throughout the state. Having located them, particular areas or deposits were selected for detailed and minute examination with a view to find out their industrial and commercial possibilities - chiefly (1) For the supply of fluxing material for the Mysore Iron Works at Bhadravati, (2) For the manufacture of calcium cyanamide, (3) For the supply of crushed limestone to be used in agriculture for manurial purposes (4) To find its suitability in the manufacture of cement. This was carried out only partially to a certain extent. (5) For other uses such as paper manufacture etc.

For the above purposes the principal deposit selected for detailed examination was the Voblapur limestone deposit in the Chiknayakanhalli taluk of the Tumkur district - the limestone area being only about 12 miles from the Banasandra railway station. Various

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* Records Vols. XV, XVII, XIX, XXI - all part II Bulletins VII & XI

were also investigated for limestone and 18

Various other areas such as Dodguni, Huliyar, Joldhal, Haranhalli, were given up either for want of quality or quantity or on account of transport facilities.

Voblapur limestone area:- The limestone deposit was first selected principally to supply fluxing material to the Mysore Iron Works at Bhadravati and also to test its suitability for the manufacture of calcium cyanamide. Considerable amount of prospecting work was carried out in this area by putting in pits and trenches to find out the quantity available as well as the quality. A detailed report on the work done will be found in Departmental Records volumes XV and XVII, parts II. A reference to them will show that a very large quantity of limestone of an average grade with a more or less uniform percentage of CaO content is avaialable for any industrial purpose. A list of the analyses of samples from different outcrops entending over a large area taken from surface as well as at depth is also appended to this report. This gives a very clear idea of the quality of limestone to be depended upon for any purpose.

The high calcium and dolomitic limestones in the area, although intimately mixed up in places, occur in separate and well defined bands or outcrops over a major portion of the deposit and can be very well worked for the particular variety of limestone required. An average analyses of a number of samples from the main outcrop gives from series A to G.

| | |
|---|---|
| Insoluble residue | 4.98 |
| $SiO_2$ | 4.60 |
| $Al_2O_3$ | 1.09 |
| $Fe_2O_3$ | 0.80 |
| MnO | 0.98 |
| CaO | 50.27 |
| MgO | 1.35 |
| | 100.07 |

The CaO content varies from 49 to little over 50% while the MgO is less than 1.5% which appears to be quite suitable for a limestone required for manufacturing cement.

A survey for laying out a railway line from Ammasandra station between Banasandra and Yelladbagi to the Voblapur Quarries was made. A suitable road for motor lorry for transporting material to and from the quarry was constructed and about 10,000 tons of the high calcium limestone were quarried and stacked. Subsequently the Voblapur deposits were abandoned by the Iron Works owing to the long lead from Bhadravati and another deposit nearer on the slopes of Shankargudda was located, prospected and worked for the supply of flux to Bhadravati; this was also abandoned in favour of the Bhadigund limestones, situated much nearer to the Bhadravati works.

The other material which is essential for the manufacture of cement is, as mentioned before, clay. With the object of locating a large area which will supply a considerable quantity of this material near the limestone deposit of Voblapur, some amount of prospecting work was carried out in the fields belonging to the villages of Kondli, Huskondli and Kavinhalli. Although there is good plastic clay in some of the fields spread over 40 acres, the depth to which it extends is very shallow being not more than 4 to 5 ft. Other areas examined were near Banasandra in the fields belonging to that village to the east of the Chicknayakanhalli-Banasandra road and two other places (1) near the Voblapur limestone deposit itself and (2) in the Kotigal area which is about 3½ miles north east of Voblapur. Further detailed investigation by means of bore-holes is necessary to find out the exact quantity available in all these areas and in case a large quantity is proved to be available, whether the quality of clay is suited for the manufacture of cement.

In the year 1919, 150 lbs of Voblapur high calcium limestone were supplied to the Economic Conference office for despatch to Mr. Norotham Gokuldas of Bombay for testing its suitability in the manufacture of cement at Katni. No report has yet been received in this office as to the results of the tests.

In the selection of a suitable site for the location of a cement plant, the following important factors are to be carefully considered before arriving at a definite decision. They are (1) Chemical

composition of the materials - (2) Amount of materials available, (3) Location of deposit with respect to transportation facilities.

About (1) Chemical composition, I consider the Voblapur limestone to be suitable for cement manufacture, but before it is finally decided it is absolutely necessary that large bulk samples of limestone and clay should be tested in some cement works and the resulting product should be examined by experts.

As regards item (2) Material available. This depends to a very large extent on the quantity which the proposed cement plant has to produce per year. From the review of the foreign railborne trade of the state for the year 1928-29 the total quantity of cement imported is about 7140 tons. On this basis if it is proposed to locate a plant, say for an annual output of 10,000 tons, the consumption, approximately of raw materials will be 7,500 tons of limestone and 2,500 tons of clay. Assuming for calculation purposes that Voblapur limestone weighs 160 lbs per cubic foot, the quantity of limestone required per year will be 1,05,000 c.ft. and clay at 27 c.ft per ton will be 67,500 c.ft. In order to justify the erection of a plant there should be, at least, 20 years supply of raw materials in sight. As I mentioned beforem Voblapur deposit is capable of supplying this quantity or even more of limestone and for clay it is a matter requiring further investigation.

The third item is about transportation facilities. This is an important matter and should be decided in consultation with the railway and other departments concerned. For my part I do not consider it desirable to locate the plant far removed from the site of the raw materials as the cost of the finished product will be unnecessarily increased by the transport of raw materials to long distances.

Power- The question of power for a cement work is secondary only to that of raw materials and must therefore receive the most careful consideration. The success of the concern will depend largely with judgment used in deciding this part of the works. The

The type of motive power adopted will also depend on a number of considerations, chiefly on the type of transmission whether electrical or through shafting etc. For the successful working of the undertaking, a cheap supply of both is necessary. The choice is practically limited to one of the following:-

1. Electric power
2. Gas-engines with gas producing plants,
3. Steam engines.

Each one of the above has its advantages. The present day practice in cement works equipped with up-to-date plants is to use electrical power for practically all purposes except in some instances to grind clinker. This is done by using coal. This practice is also giving way to the electric system as it is considered to possess many advantages. Electric power is already available at Soldevanhalli. But this is a matter of detail which has to be approached from an engineering as well as from the manufacturing point of view and has to be decided in consultation with the Electrical and Industries Departments as to the type of machinery required and the quantity of power available. The type of machinery selected will determine the whole design of the power plant which must render unfailing service efficiently for years.

As for the suitability or otherwise of the buildings at Soldevanhalli for the location of the cement plant I have already said that the works have to be located as near as possible at the site of the raw materials which will save the cost of transport considerably and thus minimise the cost of production. This matter has to be decided in consultation with the departments mentioned above.

I have the honour to be,

Sir,

Your most obedient servant,

Offg. Deputy Director,

Mysore Geological Department.

Bs.2/xi

28

## Analyses of Voblapur Limestones.

### Main outcrop A.

| Registered No. | Laboratory No. | Loss on ignition. | Insoluble residue | $SiO_2$ | $Fe_2O_3$ | $Al_2O_3$ | MnO | $TiO_2$ | CaO | MgO | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R/908 | 1058 | 40.42 | 7.08 | | 1.40 | | | | 49.60 | 1.25 | Places wherefrom samples were taken, have been approximately marked on the enlarged map of Voblapur. |
| R/910 | 1046 | 41.35 | 5.75 | | 1.10 | | | | 50.70 | 1.16 | |
| R/956 | 1056 | 40.05 | 7.72 | | 1.10 | | | | 49.90 | 1.26 | |
| R/957 | 1057 | 38.16 | 11.86 | | 1.75 | | | | 46.10 | 1.53 | |
| R/958 | 1059 | 41.06 | 6.42 | | 0.85 | | | | 50.65 | 0.99 | Sample of equal parts of these gave:- |
| R/959 | 1060 | 42.85 | 2.31 | | 0.85 | | | | 53.00 | 1.19 | Insol. 7.04 |
| R/960 | 1061 | 40.42 | 7.33 | | 1.60 | | | | 48.80 | 1.54 | $SiO_2$ 5.23. |
| Average of above | | 40.61 | 6.92 | | 1.23 | | | | 49.82 | 1.27 | |
| Analysis of Avg. samples composed of equal parts of above. | 1368 | 40.79 | | 4.89 | 1.34 | 0.64 | | 1.14 | 50.64 | 1.09 | |

## Voblapur Limestones.

Another series from Main outcrop - B.
These contain some admixture of dolomite.

| Registered No. | Institute No | Loss on ignition | Insoluble residue | $SiO_2$ | $Fe_2O_3$ | $Al_2O_3$ | MnO | $TiO_2$ | CaO | MgO | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R/426. | 743 | 40.76 | | 4,32 | 1.23 | | | | 49.90 | 2.86 | These samples were analysed at the Indian Institue of Science. Approximate places wherefrom the sample was taken have been marked on the enlarged map of Voblapur. |
| R2/427 | 744 | 40.40 | | 4.70 | 1.20 | | | | 49.90 | 2.26 | At this place there are small brown spots and streaks in the high calcium limestone. The sample was chipped from 7 different places along the width of the outcrop extending for about 150 to 200 ft. |
| R2/429 | 745 | 39.10 | | 6.42 | 2.54 | | | | 47.89 | 2.20 | Do. for R2/427 & 429. |
| R2/431 | 746 | 40.06 | | 5.42 | 1.61 | | | | 49.32 | 2.39 | From the Main outcrop brown spots not conspicuous. |
| Average of above. | | 40.08 | | 5.22 | 1.65 | | | | 49.25 | 2.43 | |

Another series from Main outcrop. C.

| Registered No. | Laboratory No. | Loss on ignition. | Insoluble residue | % $SiO_2$ | $Fe_2O_3$ | $Al_2O_3$ | MnO | $TiO_2$ | CaO | MgO | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| JL/1 | $M_2$-1951 | | 7.33 | | 0.90 | | | | 49.31 | 0.92 | From the outcrop 20 yds N.W. of JL/2. |
| JL/2. | M1-1950 | | ~~8.03~~ 7.13 | | 0.95 | | | | 49.60 | 0.76 | The extreme south east end of the calcium limestone outcrop. |
| JL/3 | M3-1952 | | 3.05 | | 1.08 | | | | 50.55 | 1.51 | Mottled limestone taken N.W. from JL/7 in the Nulla. |
| JL/4 | M4-1953 | | 5.70 | | 0.90 | | | | 50.33 | 1.45 | From the bottom of the outcrop in the deepest bend in the Nulla at the North end of the outcrop. |
| JL/5 | M5-1954 | | 7.81 | | 0.86 | | | | 49.55 | 0.96 | About 150 yds north west of JL/1 and from the top middle portion of the cup. |
| JL/6 | M6-1955 | | 6.31 | | 0.79 | | | | 50.02 | 1.28 | From the top outcrop across the Nulla from the same place as JL/4 |
| JL/7 | M7-1957 | | 6.53 | | 0.86 | | | | 49.78 | 1.39 | From just below the highest point of the calcium limestone outcrop. |
| Average of above. | | | 6.27 | | 0.91 | | | | 49.88 | 1.18 | |
| Analysis of Average sample composed of equal parts of above. | 1361 | 40.94 | | 4.69 | 1.13 | 0.92 | 0.95 | nil | 50.16 | 1.21 | |

Another series - Main Outcrop - D.

| Registered No. | Laboratory No. | Loss on ignition. | Insoluble residue. | $SiO_2$ | $Fe_2O_3$ | $Al_2O_3$ | MnO | $TiO_2$ | CaO | MgO | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R/985 | | 40.90 | | 4.69 | 0.91 | 1.02 | 0.71 | Trace | 49.52 | 1.92 | This is a bulk sample which was made up of the following numbers:- R/956, 958, 959, 960 910, & for a place between R/956 & 957. Some tons of this were crushed in the Ball Mills on the Kolar Gold Fields and some were burnt in the kilns near Yeswantpur. The crushed powder and the burnt lime were supplied to Dr. Coleman for experimental purposes. |

Samples from near Nulla North of Main Outcrop.

Series E.

| Registered No. | Laboratory No. | Loss on ignition. | Insoluble residue | $SiO_2$ | $Fe_2O_3$ | $Al_2O_3$ | MnO | $TiO_2$ | CaO | MgO | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R/987 | 1090 | | 6.42 | | 1.19 | | | | 49.66 | 1.85 | The approximate position are marked on the enlarged map of Voblapur. |
| R/988 | ~~1091~~ | | 6.27 | | 0.81 | | | | 50.98 | 0.76 | -Do- |
| IL/48 pt 1 | M.45 | | 4.97 | | 1.78 | | | | 50.22 | 1.74 | |
| Average of above | | | 5.89 | | 1.26 | | | | 50.29 | 1.45 | |
| Average samples composed of equal parts of above. | | 41.25 | | 3.98 | 1.17 | 0.59 | 1.62 | Nil | 50.33 | 1.19 | |

Samples from Pit 2 - F.

| Registered No. | Laboratory No. | Loss on ignition. | $SiO_2$ | $Fe_2O_3$ | $Al_2O_3$ | MnO | $TiO_2$ | CaO | MgO. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| Average of analyses of JL/11 12,13,14, 20, 23, 24, 27, 28 30, 35, 36, 39, 40, 41, 44 47. | | Insoluble residue. 6.84 | | 0.92 | | | | 50.19 | 1.30 | Average of analysis of 17 samples from 1½ to 18½ ft. in depth from Pit 2. |
| Analysis of average samples composed of equal parts of above. | 1364. | 40.72 | nil | 5.05 | 0.98 | 0.95 | 0.69 | nil | 50.32 | 1.25 | |
| JL/49. | m.43 | | 7.12 | | 0.72 | | | | 49.91 | 1.68 | Bulk sample of stacks from Pit 2. |
| JL/49. | 1363. | 40.77 | nil. | 5.01 | 1.03 | 1.00 | 0.71 | Nil | 50.00 | 1.51 | Another analyses of JL/49. |

Samples from Pit 3 - G.

| Registered No. | Laboratory No. | Loss on ignition. | Insoluble residue. | $SiO_2$ | $Fe_2O_3$ | $Al_2O_3$ | MnO | $TiO_2$ | CaO | MgO. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Average of analysis of 10 samples: JL/15, 18, 21, 25, 29, 31, 33, 37, 42, & 45. | | | 5.70 | | 0.87 | | | | 50.73 | 1.12 | |
| Analysis of average samples composed of equal parts of 1365, above. | | 41.26 | | 4.20 | 1.03 | 0.65 | 0.84 | Nil | 50.64 | 1.44 | |

Appendix F G—1

SUBJECT.....

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Section DHE

File No. 27 30

Serial No. 24

No. D 3032

*Diary No. of letter replied to*.....

General and Revenue Secretariat

( )

*the* *193* .

To

The Dir. of Geology

Date of issue 15/12/31

Signed by H. W. S. Ramadas

Sir

with Refce to the correspce ending with your letter nos. 6101-9/12 dtd 7th Nov. 1931 submitting a note on the local manufacture of cement and suggesting that a Sum of Rs10,000/- may be set apart for carrying on a thorough investigation of the available raw materials and other details connected with this Scheme, I am directed to state that your proposal would have to be deferred in view of the present financial position of Govt.

List of enclosures.....

Copied by.....

Examined by.....

[over

12/12/31

for SAO Secy

WD 02559—GPB—25,000—25-6-30

Copies to the Dir. of Agr
the Chief Engineer & Secy. P.W.D.